

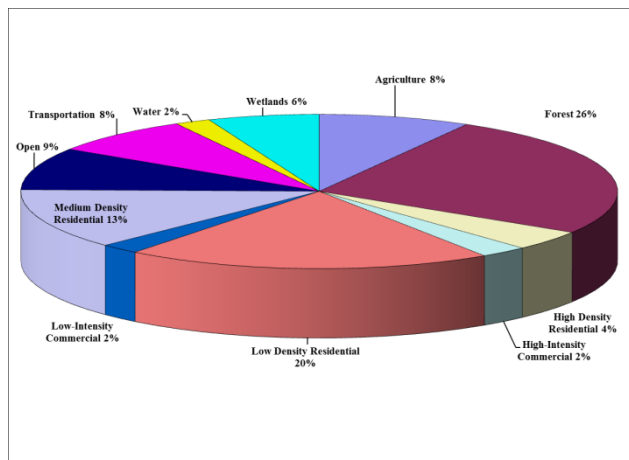
Waterbody: Lake Lafayette



Basin: Lake Lafayette

Lake Lafayette was historically a meandering, wet-land/prairie lake system located in eastern Leon County, but land alterations in the mid-1900s separated the lake into four distinct sections, known as Upper Lake Lafayette, Lake Piney Z, Alford Arm, and Lower Lake Lafayette. Limited hydraulic connectivity occurs between the various sections, much of which is present only during high water elevations. Because of the compartmentalization of the four sections, each section is treated as a separate “lake”.

As shown in the following pie chart, commercial, residential, agriculture and transportation uses make up approximately 57% of the 53,097 acre Lafayette Basin. Increases in stormwater runoff, and water-body nutrient loads can often be attributed to these types of land uses.



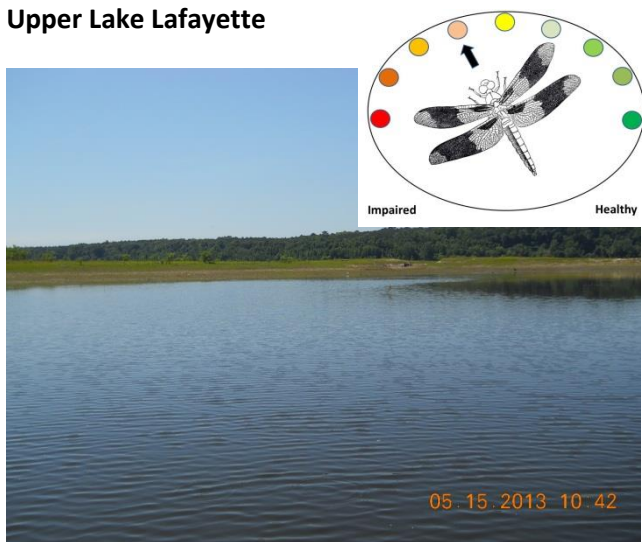
Background

Healthy, well-balanced lake communities may be maintained with some level of human activity, but excessive human disturbance may result in water-body degradation. Human stressors may include increased inputs of nutrients, sediments, and/or other contaminants from watershed runoff, adverse hydrologic alterations, undesirable removal of habitat or riparian buffer vegetation, and introduction of exotic plants and animals. Water quality standards are designed to protect designated uses of the waters of the state (*e.g.*, recreation, aquatic life, fish consumption), and exceedances of these standards are associated with interference of the designated use.

Methods

Surface water and sediment samples were collected to determine the health of Upper Lake Lafayette, Piney Z and Lower Lake Lafayette and met the requirements of the Florida Department of Environmental Protection (FDEP). Although Alford Arm contains areas of standing water, the vast majority is covered by dense stands of both submergent and emergent wetland vegetation. Because of the dense vegetation and low water conditions, samples could not be collected for most of 2010, and no samples were collected in 2011-2014. Staff also conducted a Lake Vegetation Index (LVI) on Lake Piney Z to evaluate the health of the floral (plant) community.

Upper Lake Lafayette



The typically phosphorus-limited Upper Lake Lafayette is the westernmost lake in this system. The most dominant feature of Upper Lake Lafayette is the sinkhole (Lafayette Sink) that is located in the northeastern portion of the lake and drains into the Floridan Aquifer. The majority of the water entering Upper Lake Lafayette ultimately discharges into the sink area. As a result, the area and volume of the lake is highly variable. During typical rainfall periods, the area around Lafayette Sink becomes a 300 acre lake, but following dry periods, the lake bed can drain almost completely into the sinkhole. The heavily urbanized Northeast Drainage Ditch and Lafayette Creek are the primary sources of water for the lake. Three other minor contributing sources are two small tributaries to the north of the lake and Lake Piney Z.

The EPA established a TMDL on Upper Lake Lafayette in March 2012 that requires a 36% reduction in total phosphorus. The City of Tallahassee hopes to comply with the TMDL by the converting the Weems Pond Regional Stormwater Treatment Facility (Weems Pond) into an alum-injection facility. The retrofit of the facility will improve the pollutant removal efficiencies of the system and reduce pollutant loads that leave the pond and flow downstream through the Northeast Drainage Ditch and ultimately, to Upper Lake Lafayette. Construction is ongoing and the facility should be online in 2015.

Results

Nutrients

The nutrient thresholds and results are found in Table 1. According to FDEP requirements, Numeric Nutrient Criteria (expressed as an annual geometric mean) cannot be exceeded more than once in a three year period.

Table1. FDEP's chlorophyll *a*, total nitrogen and phosphorus criteria for lakes applied to Upper Lake Lafayette. Results in bold signify exceedances of the State criteria.

Clear Lakes, High Alkalinity	Chlorophyll- <i>a</i> 20.0 µg/L	Total Nitrogen Threshold 1.05-1.91 mg/L	Total Phosphorus Threshold 0.03-0.09 mg/L
2004	2.3	0.33	0.04
2005	25.2	0.81	0.10
2006	3.3	0.56	0.09
2007	4.9	0.60	0.07
2008	24.5	0.60	0.15
2009	6.9	0.43	0.08
2010	6.9	0.77	0.07
2011	32.7	0.68	0.10
2012	31.0	0.90	0.15
2013	16.8	0.79	-
2014	-	-	-

The table shows that the geometric mean of chlorophyll *a* and total phosphorus exceeded the state criteria in 2005, 2008, 2011 and 2012. Due to an apparent erroneous reading, the total phosphorus result could not be calculated for 2013. Staff could not access and collect samples to the Upper Lake Lafa-

yette site during the 1st quarter of 2014, so State data requirements could not be calculated for that year. However, the geometric means of three samples that were collected suggest that chlorophyll *a* (7.2 µg/L) and total nitrogen (0.93 mg/L) would have met the criteria. Total phosphorus (0.11 mg/L) was elevated and would have exceeded the Class III NNC.

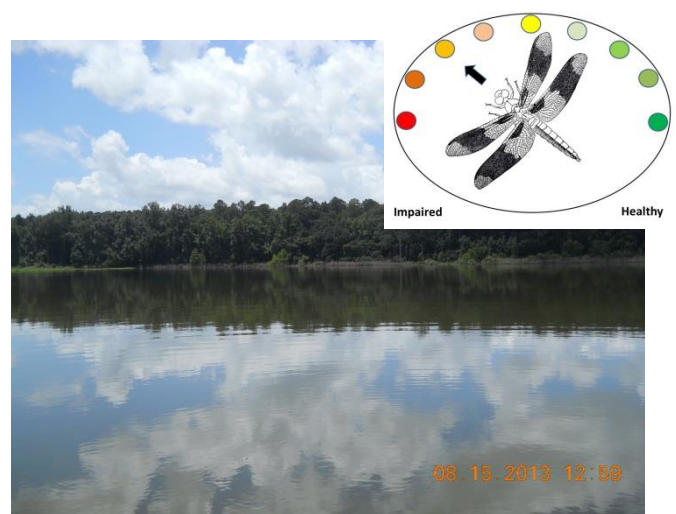
Elevated nutrient levels in Upper Lake Lafayette may occur due to the urbanized inflow streams combined with the fluctuating lake volume. The reduced volume concentrates incoming pollutants, reducing the lake's ability to assimilate the incoming nutrients.

Other Parameters

Due to storm water runoff in the watershed, turbidity levels (16 NTU) during the September 2014 sampling event were elevated when compared to other results (average was 7.1 NTU). Other water quality parameters appear to be normal for the area and no other impairments were noted.

Conclusions

Based on ongoing sampling, Upper Lake Lafayette did not meet the nutrient thresholds for the East Panhandle Region. Elevated nutrient levels in the lake may occur due to the urbanized inflow streams combined with the fluctuating lake volume. The reduced volume concentrates incoming pollutants, reducing the lake's ability to assimilate the incoming nutrients. Due to storm water runoff in the watershed, turbidity levels during the September 2014 sampling event were elevated when compared to other results. Other water quality parameters appear to be normal for the area and no other impairments were noted.



Piney Z

Lake Piney Z is a 228 acre waterbody located between Upper Lake Lafayette and Lower Lake Lafayette which consists primarily of an open water system, although substantial stands of vegetation were historically present within the lake.

Lake Piney Z can discharge to Lower Lake Lafayette via two outfalls located on the east end of the lake and/or can discharge to Upper Lake Lafayette via a ditch and outfall located on the west side of the lake. Lake Piney Z receives stormwater inflow from the Piney Z Plantation development and the Swift Creek Middle School stormwater pond on its northern shore, from a few holding ponds near the southern portion of the lake and also from the dirt road that surrounds the lake.

In 1997, Lake Piney Z was drawn down and organic matter was scraped from the bottom and used to construct fishing fingers extending north from the southern bank. Following construction of the fishing fingers, the lake was restocked with game fish. Currently, the Florida Fish and Wildlife Conservation Commission, in cooperation with the City of Tallahassee, manage Piney Z as a Fish Management Area.

Results

Nutrients

The nutrient thresholds and results are found in Table 1. According to FDEP requirements, Numeric Nutrient Criteria (expressed as annual geometric means) cannot be exceeded more than once in a three year period.

Table1. FDEP's chlorophyll *a*, total nitrogen and phosphorus criteria for lakes applied to Lake Piney Z. Results in bold signify exceedances of the State criteria.

Clear Lake, Low Alkalinity Piney Z	Chlorophyll- <i>a</i> 6.0 µg/L	Total Nitrogen Threshold 0.51-0.93 mg/L	Total Phosphorus Threshold 0.01-0.03 mg/L
2004	6.48	0.45	0.04
2005	12.98	0.78	0.05
2006	25.17	0.70	0.08
2007	2.92	0.96	0.04
2008	8.78	0.73	0.04
2009	4.43	1.33	0.06
2010	17.2	1.06	0.07
2011	36.43	1.28	0.08
2012	32.62	1.65	0.06
2013	27.01	1.12	-
2014	6.02	1.05	0.04

The table shows that the geometric mean of chlorophyll *a* and total phosphorus exceeded the state criteria throughout the sampling period. Due to an apparent erroneous reading, the total phosphorus result could not be calculated for 2013.

The excessive chlorophyll *a* and nutrient levels are the result of the lake's management. The ongoing herbicide program and the addition of grass carp to Piney Z have led to an almost completely open water system. Nutrients are being assimilated by algae instead of being taken up by vascular plants, leading to massive and long lasting algal blooms. While this may lead to a productive largemouth bass fishery in the short term, overall long term ecosystem health continues to suffer.

Biological Oxygen Demand (BOD)

BOD results were elevated, ranging from 2.0-8.3 mg/L. Like the elevated nutrients and chlorophyll *a*, this is in response to the fishery management strategy.

Floral Assessment

Ironically, the Lake Vegetation Index score for Lake Piney Z was 52, placing the lake's vegetative community in the healthy category.

Sixty four species were found during the survey. Buttonbush (*Cephalanthus occidentalis*), pond cypress (*Taxodium ascendens*), American sweetgum (*Liquidambar styraciflua*), American cupscale grass (*Sacciolepis striata*), and Chinese tallow tree (*Sapium sebiferum*) were the most dominant species in the lake. Other native shoreline vegetation included red maple (*Acer rubrum*), coastal plain willow (*Salix carolina*) and pond cypress (*Taxodium ascendens*). Unfortunately, water hyacinth (*Eichhornia crassipes*), wild taro (*Colocasia esculenta*), torpedo grass (*Panicum repens*), kudzu (*Pueraria montana*), water spangles (*Salvinia minima*), and Chinese tallow (*Sapium sebiferum*), all listed as Category I Invasive Exotics by the Florida Exotic Pest Plant Council were found in the littoral zone of Piney Z. Alligator weed (*Alternanthera philoxeroides*) is a Category II Invasive Exotic found in the lake. Additionally, the exotic vaseygrass (*Paspalum urvillei*) and Japanese climbing fern (*Lygodium japonicum*) were also found in and near the lake.

[Click here for more information on the Lake Piney Z LVI.](#)

[Click here for more information on common exotic and invasive plants in Leon County wetlands and waterbodies.](#)

Fish Consumption Advisory

The Florida Department of Health has issued consumption limits for certain fish in Lake Piney Z due to elevated levels of mercury.

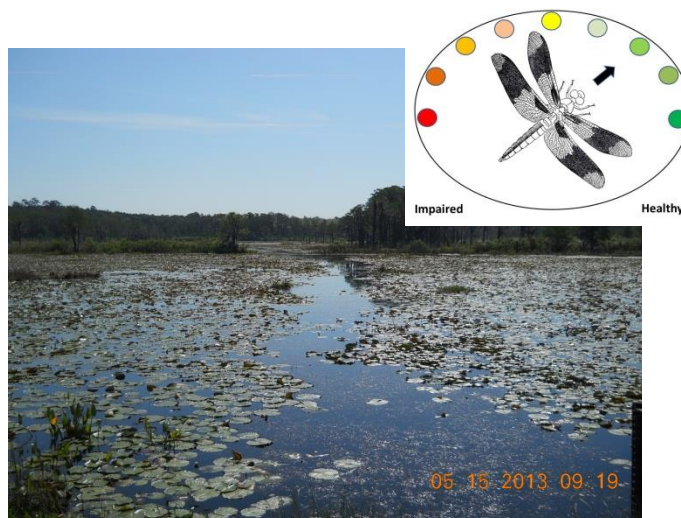
[Click here for more information about fish consumption advisories in Leon County.](#)

Other Parameters

Turbidity values in 2014 were highly variable, ranging from 2.2-19.0 NTUs. Other water quality parameters appear to be normal for the area and no other impairments were noted.

Conclusions

Based on ongoing sampling, Lake Piney Z did not meet the nutrient thresholds for the East Panhandle Region. BOD and turbidity results were elevated. Like the elevated nutrients and chlorophyll *a*, this is in response to the fishery management strategy. The Lake Vegetation Index score for Lake Piney Z was 52, placing the lake's vegetative community in the healthy category. Other water quality parameters appear to be normal for the area and no other impairments were noted.



Lower Lake Lafayette

Lower Lake Lafayette is the largest of the four lake compartments, covering an area of 1,006 acres and bordered by the Leon County Apalachee Regional Park Solid Waste Facility, Talquin Electric Sewage Treatment Plant and various residential and commercial developments. Lower Lake Lafayette is also home to a wood stork colony.

Although pockets of open water are scattered throughout Lower Lake Lafayette, the vast majority of the area is covered by dense growths of emergent and submerged vegetation, including many mature trees. Water from Alford Arm enters Lower Lake Lafayette via pipes located under the CSX railroad track. Discharges from Lower Lake Lafayette occur through an earthen channel on the eastern end of the lake and pass under Chaires Crossroad before entering the wetland system associated with the St. Marks River. Depending on water levels, water from the St. Marks River will flow into Lower Lake Lafayette. The extended drought caused low water levels in this section, which prevented water sampling during several quarters of 2007, 2008, 2010 and 2011. No water quality samples were collected in 2012 and only one water sample was collected in 2013. Access issues prevented sample collection during the latter part of 2014.

Results

Nutrients

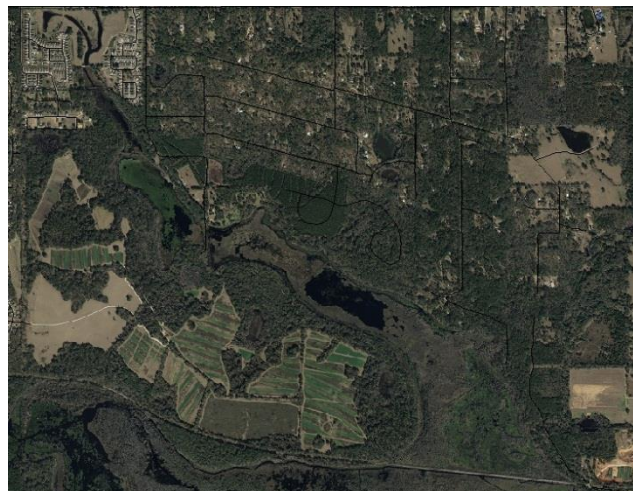
The nutrient thresholds and results are found in Table 1. According to FDEP requirements, Numeric Nutrient Criteria (NNC) (expressed as an annual geometric mean) cannot be exceeded more than once in a three year period. State numeric nutrient criteria were not exceeded during the period of record.

Table1. FDEP's chlorophyll *a*, total nitrogen and phosphorus criteria for lakes applied to Lower Lake Lafayette.

Colored Lakes LLL	Chlorophyll- <i>a</i> 20.0 µg/L	Total Nitrogen Threshold 1.27-2.23 mg/L	Total Phosphorus Threshold 0.05-0.16 mg/L
2004	3.04	0.49	0.02
2005	2.85	0.56	0.02
2006	2.34	0.72	0.03
2007	1.94	0.62	0.02
2008	-	-	-
2009	2.19	0.42	0.02
2010	2.59	0.53	0.01
2011- 2014	-	-	-

Conclusions

Intermittent sampling has made conclusions difficult. Based on existing data, Lower Lake Lafayette met the nutrient thresholds for the East Panhandle Region.



Alford Arm

Alford Arm is a 231 acre waterbody which was separated from Lower Lake Lafayette by construction of the CSX Railroad. Of the four segments that define historic Lake Lafayette, Alford Arm receives flow from the greatest area with natural cover, including Welaunee Plantation, the Miccosukee Greenway and the Alford Arm Greenway. Due to significant drought conditions in recent years, available storage along the channel intercepted most flows during the year. Although Alford Arm contains areas of standing water, the vast majority is covered by dense stands of both submergent and emergent wetland vegetation (Harper and Baker, 2005). Because of the dense vegetation and low water conditions, samples could not be collected for most of 2010, and no samples were collected in 2011 through 2014. Because of ongoing conditions, staff is eliminating this sampling station.

Thank you for your interest in maintaining the quality of Leon County's water resources. Please feel free to contact us if you have any questions.

Contact and resources for more information

www.LeonCountyFL.gov/WaterResources

[Click here to access the results for all water quality stations sampled in 2014.](#)

[Click here for map of watershed – Sample sites L02, L30, LPZ3, LLL2, LLL3, and LLL10.](#)

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